UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,826	11/20/2003	Hao-Song Kong	MERL-1519	8580

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EXAMINER
WERNER, DAVID N

ART UNIT	PAPER NUMBER
2621	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

	Application No.	Applicant(s)
Office Action Summary	10/717,826	KONG ET AL.
	Examiner	Art Unit
	David N. Werner	2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-6* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☐ Claim(s) *1-6* is/are rejected.

7) ☒ Claim(s) *1* is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *20 November 2003* is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *20031120*.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Priority

1.   This application discloses and claims only subject matter disclosed in co-pending

Application No. 10/717679, filed 20 November 2003, and names an inventor or

inventors named in the co-pending application. Since both applications were filed on

the same day, neither is a "prior application" according to 37 CFR 1.78. However, a

cross-reference to the related application is required under 37 CFR 1.78(a)(2)(i).

Information Disclosure Statement

2.   The listing of references in the specification is not a proper information disclosure

statement. 37 CFR 1.98(b) requires a list of **all** patents, publications, or other

information submitted for consideration by the Office, and MPEP § 609.04(a) states,

"the list may not be incorporated into the specification but must be submitted in a

separate paper". Specifically, Zhang et al., "A Cell-Loss Concealment Technique for

MPEG-2 Coded Video", mentioned in a list of relevant documents in paragraph [04] of

the specification, was not submitted with the Information Disclosure Statement filed 20

November 2003. As the examiner has considered this information, it is cited in the

Form PTO-892 accompanying this Office action.

Oath/Declaration

3.   The oath or declaration is defective. A new oath or declaration in compliance

with 37 CFR 1.67(a) identifying this application by its application number and filing date

is required. See MPEP §§ 602.01 and 602.02.

> The oath or declaration is defective because it was not executed in accordance
> with either 37 CFR 1.66 or 1.68. Specifically, the signature of inventor Wei-Ying
> Hung is not present in the declaration.

Specification

4.   The abstract of the disclosure is objected to because in line 1, the word "intra-

frame" is misspelled as "intra-fame". Correction is required. See MPEP § 608.01(b).

5.   The disclosure is objected to because of the following informalities:

- In paragraph [024], the ungrammatical phrase "indexes motion vectors"

  appears.

- In paragraph [030], the words "recursively" and "restores" are in reverse

  order.

- In paragraph [035], the phrase "Figures 2 shows" does not agree in number.

- In paragraph [039], the sentence "For example, the next sixteen blocks

  shown dotted in Figure 3." is incomplete.

- Paragraphs [064] through [069] contain arithmetic errors. In paragraph

  [064], (20 + 30) / 2 = 25. Then, in paragraph [065], Diff1=10, Diff2=5,

  Diff3=5, and Diff4=35. In paragraph [067], S1=11, S2=6, S3=13, and S4 is

  43, and in paragraph [068], if the threshold is 20, then only candidate C4 is

rejected. Finally, in paragraph [069], p = (C1/D1 + C2/D2 + C3/D3) / (1/D1 +

1/D2 + 1/D3) = (15/1 + 20/1 + 30/8) / (1/1 + 1/1 + 1/8) = 18 (assuming p must

be an integer).

• In paragraph [071], the phrase "When the number of the useful neighboring

pixels is reduces to two" does not agree in tense.

Appropriate correction is required.

Claim Objections

6.   Claim 1 is objected to because of the following informality: in line 1, the word

"intra-frame" is misspelled as "intra-fame". Appropriate correction is required.

Claim Rejections - 35 USC § 103

7.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8.   Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over

"Temporal & Spatial Error Concealment Techniques for Hierarchical MPEG-2 Video

Codec" (Aign et al.) in view of US Patent Application Publication 2003/0103681

(Guleryuz). Regarding claim 1, Aign et al. teaches a method for error concealment of a

macroblock using spatial interpolation. Figure 2 shows an individual pixel in an error

macroblock calculated from interpolation of boundary pixels in the four neighboring

macroblocks. Equation 2 shows the interpolation technique, weighting values of boundary pixels according to the distance to the current pixel (Section 4.2). Regarding claim 2, figure 2 shows interpolation source pixels to be directly above, right of, below, and left of the current pixel. In the current invention, only pixels directly on the outer boundary of the error macroblock are calculated from pixels in neighboring macroblocks, and inner pixels of the error macroblock are calculated from previously calculated outer pixels, while in Aign et al., every pixel in the error macroblock is calculated from pixels in neighboring macroblocks.

Guleryuz discloses a method for recovering missing blocks in an image or a video frame using spatial information from surrounding blocks in layers. Figure 2 shows an image with a missing block, divided into layers. Regarding claim 1, in the method of Guleryuz, each layer is iteratively recovered using information from previous layers [0032]. Aign et al. discloses the claimed invention except for concealing pixels in a missing macroblock using previously-concealed pixels. Guleryuz teaches that it was known to recover inner pixels in a missing region of an image from recovered outer pixels. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to conceal pixels in an inner layer of a missing region according to pixels from an outer layer of a missing region as taught by Guleryuz, since Guleryuz states in paragraphs [0065]-[0070] that such a modification would provide an error concealment method with additional robustness and versatility with improved accuracy.

Regarding claim 3, Guleryuz does not disclose the exact order of recovering

pixels in each layer. However, if the pixels in each layer were recovered in an order

starting from the upper left corner, and working along each edge of the missing region in

turn, the spiral claimed in the present invention would result. Therefore, it would have

been an obvious matter of design choice to recover pixels in a spiral order, since

applicant has not disclosed that the spiral order solves any stated problem or is for any

particular purpose, and it appears that the invention would perform equally well with

recovering pixels in each layer in a different order, such as beginning a spiral in a

different corner. A distinction is made between recovering pixels in a specific spiral

order against recovering pixels in a general outside-to-inside order, which the applicant

states will reduce estimation errors.

9.   Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aign

et al. in view of Guleryuz as applied to claim 1 above, and further in view of "Multi-

Directional Interpolation for Spatial Error Concealment" (Kwok et al.).

Regarding claim 4, equation 2 of Aign et al. shows an interpolation method that

assigns weights according to the distance of each candidate pixel and the current pixel.

If certain macroblocks are not available for interpolation, they can be ignored, as shown

in equation 3. Regarding claim 6, dX is the distance from the respective candidate pixel

of macroblock mbX to current pixel mb(i,k) being recovered. However, Aign et al. does

not use thresholding to selectively eliminate candidate pixels.

Guleryuz discloses a thresholding method used to recover pixels in a lost block of a picture. Regarding claim 4, first, an initial value of the missing macroblock is set, such as the mean value of the pixels surrounding the missing block, another value derived from statistical analysis of the surrounding pixels, or a predetermined constant [0032]. The pixels are recovered using transforms over a target layer in the missing block, and quantized using a hard threshold [0032]. The process is selectively iteratively repeated using a smaller threshold [0033]. However, Guleryuz uses thresholding to further refine initial estimates for lost pixels, not to eliminate extraneous factors at the beginning of an interpolation calculation.

Kwok et al. discloses a method for spatial interpolation of lost pixels in an image using smoothing across many directions. First, edges that pass through a missing pixel block are determined (section 3.1). This is done by finding gradient measures for pixels bounding the missing block in eight directions. Then, a voting system determines which directions have the highest gradient values over all the surrounding pixels. The directions that have a total gradient value within a certain threshold value are kept, and the pixels in the missing block are spatially interpolated over the chosen directions (section 3.2), using the same equation as Aign et al.

Aign et al. in combination with Guleryuz discloses the claimed invention except for setting a threshold value to eliminate candidate boundary pixels that have little effect on a missing block. Kwok et al. teaches that it was known to spatially interpolate pixels in a missing block over directions that meet a certain threshold. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was

made to only interpolate candidate pixels over directions according to a threshold, as taught by Kwok et al., since Kwok et al. states in section 1 that such a modification would increase restoration of detail in a missing block.

Regarding claim 5, Guleryuz discloses the claimed invention except Guleryuz sets a threshold to be the standard deviation of pixel values from known surrounding pixels [0032], or the standard deviation of additive noise [0035], and the claimed invention sets the threshold to be twenty. However, it would have been obvious to one having ordinary skill in the art at the tie the invention was made to set a threshold to a certain constant, since it has been held that discovering an optimum value of a result-effective variable involves only routine skill in the art. See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Conclusion

10.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- US Patent 5,442,400 A (Sun et al.)

- US Patent 5,621,467 A (Chien et al.)

- US Patent 6,744,924 B1 (Hannuksela et al.)

- US Patent 6,990,151 B2 (Kim et al.)

- US Patent Application Publication 2001/0040926 A1 (Hannuksela et al.)

- US Patent Application Publication 2004/0146113 A1 (Valente)

- US Patent Application Publication 2005/0111743 A1 (Kong et al.)

- "Image Inpainting" (Bertalmio et al.)

- "An Implementation of a Computational Theory of Visual Surface Interpolation (Grimson)

- "A New Method for Block Effect Removal in Low Bit-Rate Image Compression" (Luo et al.)

- "Constrained Iterative Restoration Algorithms" (Schafer et al.)

- "Maximally Smooth Image Recovery in Transform Coding" (Wang et al.)

- "Signal Loss Recovery in DCT-based Image and Video Codecs" (Wang et al.)

- "A Cell-Loss Concealment Technique for MPEG-2 Coded Video" (Zhang et al.)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is (571) 272-9662. The examiner can normally be reached on Monday-Friday from 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

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you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DNW

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